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ABSTRACT

The Teaching Facilitator portion of the Mathematics for Tomorrow project seeks to help a small number of teacher-leaders acquire the skills, beliefs, and knowledge they will need to lead their peers in ongoing inquiry and investigation into mathematics teaching practice. This descriptive study examines the experiences, beliefs, and concerns of seven teacher leaders who were involved in the study over a period of two years. Facilitators views about the nature of inquiry and inquiry groups, the role of their own knowledge of mathematics and beliefs about pedagogy, and the tensions between taking on leadership and maintaining collegial relationships with peers represent significant issues for facilitators. This paper addresses both conceptual issues concerning facilitators developing knowledge, roles, identity, and power, and more practical issues of time and other supports needed to make these new roles feasible. (Contains 30 references.) (Author/JLS)

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Leadership in Collaborative Teacher Inquiry Groups

by James K. Hammerman

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Abstract

The Teaching Facilitator portion of the Mathematics for Tomorrow project seeks to help a small number of teacher-leaders acquire the skills, beliefs, and knowledge they will need to lead their peers in ongoing inquiry and investigation into mathematics teaching practice. This descriptive study examines the experiences, beliefs and concerns of seven teacher leaders who worked with us over the course of two years. Facilitators' views about the nature of inquiry and inquiry groups, the role of their own knowledge of mathematics and beliefs about pedagogy, and the tensions between taking on leadership and maintaining collegial relationships with peers represent significant issues for facilitators. The paper addresses both conceptual issues concerning facilitators' developing knowledge, roles, identity, and power; and more practical issues of time and other supports needed to make these new roles feasible. In doing so, the paper hopes to contribute both to knowledge about teacher leadership, and to the design of future projects.

Introduction and Rationale

Calls for reform in elementary mathematics education in recent years require substantial shifts in how many teachers view mathematics, learning, and teaching. Mathematics is no longer seen as a set of facts and techniques to be memorized but a set of ideas to be encountered and understood through ongoing exploration and discourse in the context of a community of learners (NCTM, 1989; 1991; 1995). Teaching that supports this type of learning is not the technical delivery of information but is, rather, the facilitation of knowledge construction (Nelson & Hammerman, 1996; Schifter & Fosnot, 1993).

For many teachers, developing a practice that supports students' construction of knowledge will require deep, epistemological shifts in their views about the nature of knowledge, their understanding of mathematics, and their conceptions of teaching. Such shifts take time and ongoing attention, preferably in the context of a supportive community of inquiry into practice (Cochran-Smith & Lytle, 1992; Nelson & Hammerman, 1996). Teachers must "construct" a new, *constructivist* view of learning and teaching. But traditional district professional development resources are often limited in scope, of short-term duration, decided on by administrators rather than teachers, and must be distributed "equitably" within a district, often implying limited engagement for any particular teacher.

Yet other models are possible. Such models could offer teachers opportunities to work together to investigate mathematics and pedagogy, seeking to improve practice by coming to understand content, learning, and the complicated subtle moves involved in effective teaching. What would such an ongoing community of discourse into practice look like? How could teachers come to lead such communities themselves so that they might continue

indefinitely to provide a site for ongoing professional development? What issues arise for teachers as they seek to create and support their colleagues in the construction of new ways of thinking about mathematics and pedagogy? This paper explores the experiences of several teachers who have worked with us to take on such roles in the Mathematics for Tomorrow project.

The Project

Mathematics for Tomorrow (MFT) is a systemically embedded, four-year, National Science Foundation funded project through the Center for Development of Teaching at Education Development Center in Newton, MA. Two cohorts of teachers have worked with the project for two years at a time starting in the summer of 1993. They participated in intensive summer institutes in each of two summers; biweekly, district-based, academic year "inquiry groups" which take place after school in schools during each of two school years; four day-long workshops through the school year; and several consultation visits by project staff to each teachers' classroom each year.

The first cohort of 23 teachers worked with us from 1993-1995 and came from three Boston area communities: Arlington (white working- and middle-class suburban), Brookline (ethnically diverse urbanized suburb with a large immigrant population) and Cambridge (racially mixed urban with two prestigious universities). The second cohort of 34 teachers began work on the project in the summer of 1995 and included these three communities as well as teachers from the city of Boston. For the most part, teachers came to the project in school-based teams. They received a stipend and professional development points for their participation, and were offered an opportunity to receive course credit for work in the summer institute. Their building principal and district administrators committed support to the project and most administrators have participated in a monthly Administrators Inquiry Group that we began in 1994. Districts also committed money for classroom materials and for release time for day-long workshops.

MFT was designed to build district capacity to continue the inquiry groups (started under the auspices of EDC) after project funding ends. Our plan was to work with a small set of teachers from the first cohort during the second two year cycle for them to become "Teaching Facilitators"[1]—teacher leaders of inquiry groups who would gradually take over staff responsibilities for leading inquiry groups and would continue to do so under the auspices of the Educational Collaborative of Greater Boston (EDCO) into the indefinite future. Teaching facilitators attend regular district-based inquiry group meetings discussing

[1]For the most part in this paper, I refer to teachers taking on these leadership roles as "facilitators" or "teaching facilitators", to other teacher participants as "teachers", and to project staff as "staff."

them afterwards with project staff. They also attend a monthly "Teaching Facilitators' Inquiry Group" where we discuss issues arising in the facilitation of inquiry groups. They work with project staff to plan inquiry group sessions and some of the day-long workshops. The "Teaching Facilitator" aspect of the project has been complex and interesting. This paper reports on research done on the experiences of facilitators over the course of these past two years, and identifies some issues and themes that are of interest to those trying to understand and design programs for collaborative teacher-leadership.

Background

The work of developing as a facilitator of teacher inquiry groups is intricately bound up with the development of the groups themselves—what is required of a facilitator depends in large measure on how the work of the group is conceived and actualized. Thus, communities organized for teacher research (Cochran-Smith & Lytle, 1992; Magau, 1990), require different things than those whose explicit purpose is assessment of student learning (Seidel, 1992 offers a review of four models), or enculturation of pre-service teachers (Cochran-Smith, 1991), or those organized for a variety of other purposes (Little & McLaughlin, 1993; McDonald, 1986; Schifter, 1993). People have designed and studied "Teacher Thinking Seminars" (Keiny, 1994), "interpretive communities" (Kallick, 1989), and communities for "critical colleagueship" (Lord, 1994). Each of these structures offers a slightly different vision of what is possible in collaborative teacher groups, and the ideas underlying the design of such groups.

Some groups operate using explicit structures or procedures for examining student work or other case materials (Barnett, 1991; Cochran-Smith, 1991; Davenport & Schifter, 1995; Seidel, 1995) while others are either more freeform or variable in their structures (Cochran-Smith & Lytle, 1992; McDonald, 1986). Several authors offer frameworks (or suggestions, at least) for thinking about the content of, or process involved in creating and developing these discussions, with recognition that often content and process are hard to separate (Cochran-Smith & Lytle, 1992; Freeman, 1991; Hammerman, 1995). What all these groups have in common is the setting aside of time for teachers to meet together on a regular basis to share and examine classroom practice or its artifacts, and to use those reflections to gain new understandings and insights, and often, to improve practice.

Groups vary in their goals and purposes, in their structures, and in their origins. They also require varying degrees of emotional or professional risk from teachers in sharing classroom data or questions, and this changes the extent to which group leaders must be able to build a trusting community. In addition, groups vary by where they see mathematical or pedagogical expertise as residing—with outside experts, within particular

members of the group, or constructed collaboratively within the group as a whole. These and other features of groups and their cultures affect what is at issue for facilitators as they take on leadership roles.

Groups may also be aiming towards different degrees of depth of change. At an important but more superficial level, groups can provide all too rare places for teachers to share ideas and questions about professional practice. But they can also support deeper developmental change for individuals as they provide contexts for people to make their assumptions about learning and teaching explicit, and to examine alternatives to these assumptions and implications of those alternatives. By supporting teachers to put their assumptions outside of themselves for examination and critical reflection, groups can support individual development as teachers come to be in *relationship* with their beliefs rather than being *controlled* by them (Kegan, 1994). This paper situates the work of teaching facilitators in part in this constructive developmental model of adult growth and change.

Methods and Data Sources

The data for this analysis come from several sources. These include audio tapes and regular field notes from the monthly inquiry group for teaching facilitators and staff from both years. I also conducted audio taped interviews with each teaching facilitator in the late fall of 1995 and again in January of 1997. These ranged from 1 1/4 to 2 1/4 hours long and were transcribed in their entirety. I used notes from planning and debriefing sessions; facilitators' reflective journals and portfolios; and occasionally field notes from other project staff when they were available.

Because this aspect of the project is formative and emerging, the study is descriptive and interpretive. The paper attempts to identify and characterize the issues and themes that teaching facilitators perceive as they work to make meaning of this new role and its requirements. The data were coded for themes, and common threads were identified. Triangulation was achieved by comparing across facilitators and across data sources, and to the extent possible, across observers and over time. Differences in perspectives were also noted in order to capture some of the complexity of the phenomena. In the first year of the study, I circulated and discussed a prior draft of this paper with facilitators, using their comments to confirm that my portrayal fit their experiences and to modify my description accordingly.

It is important to note that my role in the research was as a participant-observer of inquiry groups and the Teaching Facilitator Inquiry Group (TeFIG). I was responsible

(along with other EDC colleagues) for planning and running the summer institute and day-long workshops, for one of the three inquiry groups, and for the TEFIG. This perspective gives me insights from my own experience into some issues concerning the running of inquiry groups. At the same time, it requires care in acknowledging and identifying my biases. By reflecting on my practice and working with others throughout this project, I have tried to turn my close connection to the phenomena under study into an asset rather than a liability (Oleson, 1994; Peshkin, 1988).

Because the teaching facilitator portion of MFT is formative and emerging, its structure and specific content has shifted in response to what we are learning about facilitators' needs in part because of this study. An earlier draft of this paper (Hammerman, 1996) indicated the importance of actively seeking to shift power relationships both in the inquiry groups and in the TEFIG, a move which we have pursued and, to some extent, accomplished. Our practice as teacher educators has been reflective and responsive to the teachers we work with, and the paper describes some of these shifts and decisions, both to understand the changing context of the facilitators' experiences and as a window into the practice of being a constructivist teacher educator.

Program Context & Brief Biographies

This study focuses on the beliefs and experiences of the seven teachers who have worked with us over the course of two years as teaching facilitators. Who these teachers are and their history with the project is important for understanding their experiences, so I will begin with brief biographies and some project history.

The Teachers

- Elizabeth is in her early 30s, is white, and has been teaching Kindergarten for 7 years in a racially mixed school. She is divorced, has a school-age daughter, and finished her Masters degree in Education at a local private college in June, 1996.
- Doris is in her late 30s, is white, and has been teaching for 15 years. She currently teaches first grade and just started in a newly formed Masters level program called "Teacher as Leader" at the same local private college. She is married and has two teen-age stepsons.
- Ginny is white and in her early 50s. She is in her 30th year of teaching, currently in a fifth grade classroom. She also just started the "Teacher as Leader" Masters degree program and is married with an adult daughter and son just finishing college.
- Stephanie is also white and in her mid 50s and has taught for 28 years, currently in the sixth grade. She has a Masters in sociology, is unmarried and has no children.
- Betty is white and in her late 20s. She has a Masters in Teaching and has taught for 6 years. She is currently an elementary math specialist, and is married with no children.
- Sophie is in her early 50s and is white. She taught for 3 years in California before pausing in her career to have two children, a daughter now in college, and a son in high

school. She ran a day-care center and got her Masters degree. She returned to teaching 5 years ago and has been teaching Kindergarten throughout.

- Phoebe is white, in her late 40s, and has been teaching nearly 25 years. She has a Masters degree and a Certificate of Advanced Graduate Study as well as special education and principal certification. She has taught for 17 years in her school, currently at fourth grade. She is unmarried and has no children.

Brief History of the Teaching Facilitator Program

In the spring of 1995, we put out a call to teachers participating in MFT Cycle I to apply to work with us to become facilitators. We were looking for up to 6 teachers to join the project but initially only got a single applicant, and this application raised concerns for project staff because the teacher seemed inappropriate for the type of leadership position being created. After denying her application, we proceeded to actively recruit other teacher-participants and found four—Elizabeth, Doris, Ginny and Stephanie.[2] In recruiting these teachers to become facilitators, we met with them at length several times to negotiate specific changes to the proposed job description and compensation. For the most part, these changes involved a reduction in the original expectations for the role based on severe time constraints anticipated by facilitators, but we also arranged for several of them to get graduate credit for the work in the "Teacher as Leader" Masters degree program.

Facilitators attended the institute during the summer of 1995, sometimes acting as participants engaging in activities, sometimes acting as observers of group process or staff facilitation, sometimes informally facilitating small groups themselves. After reading Lord's (1994) piece on "Critical Colleagueship", they were also responsible for creating and performing a two-part skit that stimulated a comparison of two images of collegial support. This was a powerful and memorable experience both for them and for teachers.

Staff met with facilitators twice weekly during the institute to discuss what they were seeing and thinking. While staff had originally intended to include facilitators in the planning of the institute, these sessions were dropped as part of job negotiations in the spring. However, the need to work on planning re-emerged for facilitators during the 1995-96 academic year. Doris said, "[Planning the inquiry groups] is a big piece that's missing" [Phone conversation, 1/2/96].[3]

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[2]Names of Teaching Facilitators are pseudonyms.

[3]Facilitator meeting field note references first list the date of the meeting, followed by who said something when relevant, and finally the page number from the field notes. Interview quotes are noted with the facilitator's name followed by a number or range of numbers representing the line number(s) from the transcript. For Stephanie, interviews in 1995-6 and 1996-7 are identified with a I and II respectively. All other documents are described and dated more fully—e.g., "CaBrIG 12/7/95 debrief."

During 1995-96, facilitators each regularly attended one of the three inquiry groups[4] playing a variety of roles and debriefing with staff for roughly 45 minutes after each session. They also came to the monthly TEFIG meetings designed for staff and facilitators to collaboratively explore what it means to facilitate adult inquiry into mathematics teaching practice. As a group they helped plan a piece of the December day-long workshop, and Elizabeth helped lead the May workshop as one of the 7 teachers who the project had sent to the National Council of Teachers of Mathematics' (NCTM) annual conference in San Diego. Facilitators are paid an annual stipend for their work in the project—at the summer institute, inquiry groups, the teaching facilitators inquiry group, and in reflective writing.

In the spring of 1996 we began recruiting additional facilitators from among then-current teacher-participants. Our intention was to get a total of 6 to 8 teachers involved as facilitators, knowing that not all of them would continue to actually fulfill the role under EDCO. We especially hoped to recruit some teachers from Boston as we thought such teachers would have higher credibility as we tried to continue our work in Boston, and would help *us* better understand the experiences of teachers working in an urban district.

Two teachers, Betty and Sophie, agreed to join the project sometime in late spring, and a third, Jan, said she would try her hand at some facilitating during the summer institute to see how she felt about it and would consider taking on facilitation during the academic year. In May, however, Ginny and Doris were offered jobs teaching a math methods course at the local college where they were working on their Masters degrees and decided to pursue that opportunity instead of the facilitator program. Elizabeth began work in the second summer institute and then dropped out when she got word she had been accepted in a program to teach abroad for 1996-97. Stephanie remained as the sole continuing member of the facilitator group. We continued to try to recruit Boston teachers, to no avail.

During the institute, facilitators took on a variety of responsibilities leading small and whole group discussions, both planning and debriefing these with staff at the end of each day. At the end of the summer, Jan decided that facilitating was not for her, leaving us with just three facilitators. In September, we continued to actively recruit facilitators, especially those in Boston, personally inviting several teachers to join but only succeeding with Phoebe.

During the 1996-97 academic year, facilitators worked in pairs in Arlington and in the Brookline/ Cambridge inquiry groups, taking on increasingly more active leadership of the groups throughout the year. By the spring, they were taking primary responsibility for

[4]Although we work with four districts, there were too few participants from Cambridge and Brookline to constitute their own independent inquiry groups and so these were combined into a single group.

planning and running inquiry groups. They also worked with staff to plan and cooperatively run the March day-long workshop and continued to attend monthly TEFIG meetings. At this point, Sophie and Betty have made a commitment to continue the work as facilitators under EDCO, while Stephanie and Phoebe have decided to end their MFT work after this year, primarily because of concerns about time and being 'over-extended.'[5]

The time commitment required of facilitators has been an issue since our initial negotiations with the first group. It is hard for good teachers, who often spend long hours preparing for classes and serving in other district leadership roles, to find the time needed to take on responsibility for facilitating an inquiry group. Stephanie puts it bluntly.

> My biggest concern is not actually facilitating a group. I think it would be really fun and an excellent experience. It is time. I'm in school no later than 8, usually before 8 and I walk out at 6, and then do work at home. I'm living in a dream world if I think I can do something else [Stephanie II, 855-65].

Interestingly, the two teachers who have agreed to continue as facilitators of inquiry groups under EDCO have more time built into their regular teaching day than do the others—Betty's specialist job has random break time throughout the day, and Sophie teaches a half-day Kindergarten. This may have important implications for the design of leadership positions in professional development programs.

We must also note the significance of our failure, despite intensive efforts, to recruit *any* Boston teachers for the facilitator job. It may be that the time constraints experienced by most teachers are so exacerbated in a large, bureaucratic, urban district that urban teachers find it impossible even to consider taking on these responsibilities. Yet, we must also consider the possibility that the program felt too "white" for teachers who are of color themselves or who teach predominantly students of color. Though our summer institutes include discussions about race and equity issues throughout, our mathematics strives to be international and multicultural, and assigned readings include those by authors of color (Ladson-Billings, 1994; Tate, 1995), the MFT teaching staff is still entirely white and there may be subtle ways that the culture of the project feels more inclusive to white teachers than to those of color. These issues deserve further attention and investigation.

Inquiry groups

The process of learning and taking on the role of teaching facilitator is complex. It is grounded in an understanding of the nature of inquiry groups and what is required to facilitate such a process. Facilitators bring to this work a lot of what they know as teachers

[5]Ginny, Stephanie, Phoebe and Jan teach in the same district; Doris, Betty and Sophie teach in the same district; and Elizabeth teaches in yet another district.

about helping *children* learn, though this knowledge varies because individual facilitators have different strengths and perspectives and their individual classroom practices differ from one another. Yet translating this knowledge from classrooms to the inquiry group situation is not straightforward. First, the inquiry group structure is new—it's being collaboratively constructed by teachers, facilitators and staff. At the same time, any work with adult-peers is less familiar to facilitators than is work with children. In addition, because other teachers are their colleagues, facilitators imagine troubling shifts in their relationships as they assume positions of expertise and power. I will start my analysis by describing what inquiry groups are from facilitators' perspectives, and will then turn to how they facilitators their role as leaders of inquiry groups.

By experiencing inquiry groups both as participants and as leaders, facilitators develop a rich understanding of the nature of inquiry groups and of the process of change which takes place within them. Fundamentally, facilitators see inquiry groups as places where teachers expand and clarify their thinking, "building off ideas" [Stephanie I, 701] as they grapple with shared "dilemmas" [Doris, 202] and problems. It's a place where teachers "step back and reflect" [Stephanie II, 174] and "question together" about an idea, in an "honest dialogue and honest inquiry together" [Ginny, 196] rather than bringing "answers" [Ginny, 138] or even 'looking for an answer' [CaBrIG 12/7/95 debrief, Doris]. It is a place to "process things that are happening in practice and in kids' thinking that in the everyday run of our jobs we don't get to delve into" [Betty, 16-7]. It is a place for engaging with questions, not hearing a presentation. "I don't believe they wanted to go and listen to someone else do show and tell" [Stephanie I, 885-6].

What Groups Do

Some inquiry group investigations start with mathematics, whether it's brought in explicitly by the facilitator usually at the request of the group, or arises out of an examination of a classroom "vignette" describing student thinking. These explorations serve to expand teachers' own understanding of mathematical ideas and of the nature of mathematics, while also providing a chance to reflect on their own and students' learning processes. Commenting on "what's important for people to learn from inquiry groups" Stephanie unequivocally declares "mathematics" but sees this understanding as the basis for "understanding how *kids* are learning the mathematics so our teaching can adjust to that" [Stephanie II, 158-60]. Betty describes several mathematical investigations—of subtraction algorithms, of number systems and place value, of divisibility through investigation of line-drawings—as "powerful" [Betty, 107]. For Sophie, "Math for Tomorrow is...really changing the way you view a whole field of study" [Sophie, 179-

80]. "You've helped me begin to think in a divergent way about mathematics instead of a convergent [way]. Which could be a useful metaphor for all the ways I've changed...since I came into the program" [Sophie, 144-7].

Being a mathematics learner again has powerful implications for classroom practice. "I think some of the [changes in belief about learning] come because teachers have had the opportunity to be a learner and explore something in-depth in a group...Since *you've* had a positive experience, you may *be* more likely to try it in your classroom" [Elizabeth, 97-103]. Sophie says, in her classroom, "I'm not doing *stuff* anymore, I'm really doing *ideas*" [Sophie, 118-9] by which she means she's paying more attention to concepts than to activities and tasks. Betty echoes this shift, as well. "The goal is to understand why things happen so that we can be the designers and the decision-makers about how to help kids learn math rather than the collectors and gatherers of good materials that have worked for somebody else" [Betty, 57-9]. For Phoebe, the change is more personal.

> Math is an insecurity for me...I always hated math, and I can do well in math but until recently I didn't have very much of an understanding. I followed my formulas as I was told to...That was very much me. And playing with this stuff...has really been helpful. I come away knowing deep down that math has some logic to it. So when I find a kid with a problem in math, I look for where's the stumbling block in their logic. And I think that stems a lot from my total confusion about it. I had to work through that....And it always humbles me and makes me a little bit more sensitive to when kids stumble" [Phoebe, 88-103].

Teachers both come to see mathematics as something that's meaningful and about which they can make meaning, but they also come to empathize with the confusions that arise for any learner in constructing new understanding. But groups don't just focus on mathematics. Sometimes groups focus on a piece of curriculum. "We've done a lot of thinking about what was behind this, what motivated this lesson, because often times that's not apparent right up front" [Phoebe, 24-6]. Through a variety of formats throughout the two years, teachers have also brought in examples of things going on in their classrooms—"vignettes" of student thinking, or classroom dialogue, or examples of assessment tools, and so forth—for exploration and analysis. "We might reflect on a larger piece of our teaching or a particular incident with a particular child" [Stephanie II, 175-6]. For Stephanie, "the philosophy is to construct knowledge, to build knowledge. And not just for students in math but as a professional" [Stephanie II, 391-2]. Sophie says that though the groups are different from one another, at the core "it's the inquiry piece that's really important" [Sophie, 466].

Whatever form they take, groups are places where one expects to be unsure or confused about ideas. Doris describes a common type of inquiry as "uncertainty… [about]

what makes [an idea] hard for kids to understand" [Doris, 124-5]. For Stephanie, "the most exciting part...is when you can get people to ask questions or be confused, and talk about it" [Stephanie I, 220-2]. The essence of this is careful looking at practice and the reasoning underlying practice. 'The idea that you might actually stop and think about what you're doing and why is new to many teachers' [9/22/95, Stephanie, p.3]. Elizabeth also shares this view:

> The group takes it the other step where you're really looking very closely at what you're doing and why you're doing it and exploring many, many, many other possibilities of how you're teaching. Whether or not you choose to accept them, you're hearing them [Elizabeth, 140-3].

Other facilitators share Elizabeth 's sense of the importance of hearing, talking about, and "wrestling" [Doris, 244] with a variety of perspectives. Groups are places where you can "see things in a different way" [Betty, 117] or grapple with "issues that...most of us never would have thought of on our own" [Stephanie II, 267]. Phoebe imagines the process of change as taking "small steps and big steps" off a kind of "path". She says that in inquiry groups, even the "person who is so defensive [she] doesn't want to move at all hears lots of things...and maybe that plants something in the back of their head...Even if they out and out reject it, at least it's there" [Phoebe, 615-620].

> I think there's something very powerful about analyzing thinking that kids do that is correct, but something you've never thought of before. And I think there's something very powerful about thinking about something in a way you've never thought about before that clarifies something to you, or brings you to a new place [Betty, 98-102].

Culture and Relationships

This deep and careful looking is built on a foundation of support, respect, listening, and validating colleagues [Stephanie I, 671; 9/22/95, Elizabeth, p.3]. Groups are described as "accepting" [Stephanie II, 460], "affirming" [Phoebe, 77], and "comfortable" [Phoebe, 81]. "They all feel like safe places. They're real supportive of...the personal inquiry" [Sophie 467-8]. This foundation of support requires "people having made a commitment to taking the time to talk about those kinds of things" [Betty, 44-5], making a "choice to be there [out of a] commitment to themselves and to other people" [Stephanie II, 1032-3]. In part this requires that "everyone feel as though they have something to contribute to inquiry groups. You can't be passive at an inquiry group and be very happy because the way you feel valuable in inquiry group is when you're sharing as much as everyone else is sharing" [Sophie 70-3]. This commitment to one another helps build a sense of community and common purpose which is important to support deep and long-

term changes. "One of the functions of the inquiry group was...coming together on a regular basis to remind me of what I [am] trying to do" [Sophie, 168-9].

But the quality of the relationships is also essential. Stephanie stated, "If I were to do an inquiry group I think it's very important to get to know the people while you're doing mathematics" [Stephanie I, 641-2]. Ginny shares the sense that ongoing relationships are critical. "There's also the emotional and social bond, and that fits for me, too. It needs to be social in nature for me" [Ginny, 1890-1]. Betty sees the importance of "creating that personal relationship and group relationship that will allow [open communication] to happen" [Betty, 434]. These supportive relationships are essential because the process of change is risky and challenging, but also exciting.

> [Another thing that's different in inquiry groups is] putting yourself as a learner and that vulnerability, that frustration, that being a member of the group trying to figure something out. And that whole excitement of being involved in something and coming up with ideas for it or possible methods for solving it, that's very different, and quite thrilling [Elizabeth, 154-7].

For Stephanie, learning is the ultimate goal of creating a respectful community. She wants an environment where "you can be wrong and it can be good...because being wrong could maybe lead you to think of something else" [Stephanie I, 452-4]. For Betty, the safety of the group gives people "an experience that allows for change toward believing that people construct knowledge...that math can be done in a different way than is traditionally transmitted, and that through constructing it, it makes sense" [Betty, 121-7].

In our second interview, Stephanie puts the inquiry group into a broader context, where changes affect the profession of teaching as well as individual teachers. "[The inquiry group structure] is a model of action, because it promotes change. I think it can be very political, too. It can change not just curriculum and the way we teach, but the other part of professional development is how we see ourselves and our working environment. So I think it's really important that teachers are talking to each other about important things" [Stephanie II, 995-1001].

Facilitating

These images of inquiry groups bring with them a view of the facilitator's role. This role includes a combination of support, focusing, and questioning or "pushing." It involves creating a climate where people will feel comfortable taking risks and sharing questions about their practice. It requires knowledge about math, and about teaching, and a sense of how to create experiences that will be productive opportunities for teacher learning.

Implicit in their view of the facilitator role are several images of the process of teacher development and change. While Betty 's "always believed" in constructivism, she knows that "that belief [about how people learn] is a very personally held belief, one that's hard to change. And the longer you've held it the harder it is to change" [Betty, 78-80]. A corollary of this view is that while facilitators create a supportive environment in inquiry groups. teachers must be responsible for their own learning and growth. "I want to support people but I know I can't do it for people" [Stephanie I, 821].

But for change to occur, teachers (like any learners) can only start where they are. "I think I spend a lot of time being conscious about who the people are, where they're coming from and what I think their beliefs are. Because I feel the need to move people along from where they are" [Betty 164-6]. The opportunities for teachers to be math learners also builds on this principal, as does the focus on teachers bringing in examples from their own classrooms. In addition, Stephanie talks about honoring people's gripes as part of the process of building community [Stephanie I, 920-3] though later she's clear she wants more than "a gripe session" [Stephanie II, 298]. Ginny sees her role as "...learning about how to have people enter into this kind of inquiry in a way that is helpful, supportive, empowering... [and] taps into something they might have always known about teaching but hadn't gotten a feel for or had experience with" [Ginny, 303-6].

Focusing

Often, support comes in the form of focusing or redirecting group discussions. Phoebe says, "If the conversation was... 'heading toward the left' or something, I remember saying, 'Why don't we get back to the issue at hand'... Just sort of bringing the group back to...whatever it was we were dealing with, and also to keep the group where it needed to be" [Phoebe, 282-8]. Stephanie sees some tension between respect and focus. "We have respect for the people we work with, we feel they have something important to say, but...we have an agenda to cover. It can be a little bit messy, you know, dealing with folks and keeping them focused" [Stephanie II, 339-43].

For Betty, "listening to people is important so that I can hear where they're at and where they're going, and I can hear what they're saying to try to translate or reinterpret or make sure it's out on the table for everybody, and to help them process it themselves... I think [I also] put my interpretation into paraphrasing...trying to put it into context for them" [Betty, 179-90]. These interpretations serve the purpose of focusing the group's attention on particular aspects of the conversation. Sophie describes this work as embodied in her "ability to think about what [teachers] really need to hear... For example, they don't need to

have somebody tell them what's a right answer or not, they need to have some support in figuring it out" [Sophie, 420-4].

Some facilitators are much more reticent about this role and unsure of their abilities to perform it. Doris sees this as "sort of being in charge of which way [the] explorations go and develop" [Doris, 446-7] but is unsure of what to do if the discussion is less focused.

> [If the group is not going in a way that's very genuine inquiry] then you have to make that call. Boy, I don't know. I mean part of me says if the people are engaged and talking even though it's not necessarily genuine inquiry or maybe even a deep math topic...If it's within the realm of teaching practice and people are interested. I mean, I don't know, maybe waiting to see how far it's gonna go on, a little bit. I think I would have some responsibility to jump in at some point if it didn't seem like it was gonna get on some track that was more to what I felt it ought to be [Doris, 459-467].

This contrasts with Stephanie's view. "I don't think I would let the vignette go on and on and on. If the vignette didn't have that much depth to it, maybe there's a quick resolution to it" [Stephanie II, 558-60].

Ginny is also tentative about assuming the focusing role, but agrees that it must be done. "It doesn't sound very democratic, but I can also see that there's a place for you to set the agenda, as well...I mean, *you* doing it now, *us* doing it at some other point" [Ginny, 871–4]. Though Phoebe describes how she might combine listening *and* pushing, she's uncertain about her abilities to do this well. "[When someone's being defensive,] my first response would be to listen and affirm....And then what comes next is critical. Once you affirm you need to start pushing just a little bit. You need to start opening doors for them a little bit. Or at least pushing them up to the door so they'll open it. That seems to me to be the key to it" [Phoebe, 572-5]. Just a few seconds later, though, she seems less sure of herself, saying, "After the affirming, now what? And that's, I don't know. I don't know what" [Phoebe, 590].

Extending and "Pushing"

Elizabeth takes her responsibility another step, saying that a facilitator's job is not only to keep the discussion focused, but to help people take their thinking further.

> I think a good facilitator is able to extend [teachers'] thinking or have them look at something from a different perspective, or more in depth. But I think that's a hard thing to do with colleagues, to push like that. [Elizabeth, 83-6]

Just getting ideas out can be an important part of the change process. Not only does it give colleagues a chance to hear and consider new ideas, but it also gives teachers a chance to hear and relate to their *own* ideas.

> It seems to me your questioning pushes the thinking...It makes people...expand and articulate what they're...thinking...And then in the process, I've seen people maybe even change their thinking once they've articulated it, or while they're articulating it...And I think that's made me realize how important it is for everyone to really listen. [Stephanie I, 414-21]

The idea of "pushing" people as a teaching facilitator seems to be a new one for Doris in our interview—when initially asked about it, she sits silently for a long time (14 seconds), pondering it, not knowing what to say about it [Doris, 491-3]. Later, Doris says her ability to ask tough questions might depend on who she's asking, with some people "really enjoying that" and others who "might be offended or become defensive if I try to push their thinking" [Doris, 863-6]. Ginny imagines such pushing as acceptable only within a context that is mutual and "shared."

> I don't know a lot about pushing adults. I mean, as you can imagine, that wouldn't be my first choice...It's not my style. But if we're engaged in this kind of inquiry, right there there is a kind of permission that we're gonna engage in pushing each other....And I would expect...that somebody would be taking me further, too, in pushing it. In that way it seems shared...That would be interesting...to push...I haven't thought of it in terms of pushing people's thinking. But to engage in this is pushing people's thinking. It's very *aggressive* vocabulary on [Elizabeth]'s part. [Ginny, 1127-45]

While this last statement is made somewhat tongue-in-cheek, the dilemmas facilitators face as they think about taking on a role that may involve "pushing" the thinking of colleagues seems central to their learning process. This involves sorting through issues of power and relationships, and of the role of expertise in the context of collegial collaboration.

Being an "Expert"

Expertise is problematic for several reasons. In part, facilitators take the responsibilities of leadership very seriously, and they aren't sure they're up to it. Stephanie says, "I'm very afraid of the Peter principle. I'm very afraid of putting myself in the position where I'm going to be incompetent. And that's my only fear" [Stephanie II, 760-2].

Phoebe's worries get expressed in her tendency to overprepare. In her classroom teaching, she says, "I need to know all the possibilities and then it's OK to let them go ahead and explore whatever they need to explore. But I have to have visited all of those and that takes tremendous time" [Phoebe, 520-3]. In inquiry groups, she says, "I would want to be prepared...If I'm not prepared, Oh, man! I become very inflexible" [Phoebe, 856-60].

Betty has several specific and realistic worries about her skills as a facilitator though in the end, she says, "I feel confident I can make it work" [Betty, 388]. For example, she worries about being "flexible" enough to "respect other people's ways of doing things [across a] wide range" [Betty, 390-2]; and she's worried that "my sense of where to go next is not always very close to where everybody else might be" [Betty 440-1]. "I feel a responsibility to make it be a good, useful, educational, developmental experience for people. And...being able to assess whether that is being true, throughout, is something I don't feel very strong in" [Betty, 420-3].

Several facilitators are concerned about whether their math knowledge is sufficient to lead an inquiry group. Stephanie says bluntly, "First of all, if you're gonna do math, you should know some math" [Stephanie II, 573] because "it makes you a little more free to pay attention to people and to what they're saying and their mathematics instead of thinking right on your feet" [Stephanie II, 590-2]. Betty says, "you either need to have a good preparation in mathematics or the confidence to say, 'Even if I don't know it, I'm willing to figure it out with them'" [Betty, 292-4]. And Sophie is worried about "presenting the math [or] coming up with math problems" [Sophie, 336]

Finally, some facilitators are worried about group dynamics, and especially developing "strategies for dealing with...a person who doesn't want to move [intellectually] or...a person who is not respectful of somebody else in the group" [Phoebe, 746-8]. "You have to be not just sensitive to [group dynamics] but confident enough to handle it cause there may be some messy situations that pop up" [Stephanie II, 598-600] These situations require "a lot of people skills: Sensitivity, diplomacy, open-mindedness" [Betty, 335-6].

Relationships With Colleagues

To "push" colleagues, facilitators need to feel confident about their skills in a variety of realms from mathematics to group process. But having expertise is complex in other ways, as well. Specifically, facilitators are unsure how having expertise will affect their relationships with colleagues. Ginny captured this succinctly in a question she asked herself in a Masters course paper. "Can I share expertise without being presented as an expert?" [Ginny, Teacher as Research paper, 8/3/95, p.4]

Teaching facilitators have ambivalent feelings about what their new role will mean for relationships with colleagues. For Betty, "there *is* something tricky about being a leader and a teacher at the same time" [Betty, 653]. Elizabeth describes both feelings of sadness and excitement as she thinks about taking on this role.

> How does [this role as facilitator] feel? In some respects it's sad, because... there's a kinship between people kind of mucking things around together...that you lose when you become in a different place...There's that loss. I don't know if I can really describe it. But...I hear more things being in a group as a participant than... as a facilitator. Interesting things, or not so interesting things, I just think it's different. I'll be sad to lose any of that perspective. But it's also so exciting to think that I could have a role in helping anyone in their process of professional development because that in turn helps my professional development in huge ways. [Elizabeth, 296-306]

She is worried that facilitating a group will increase the distance between her and her colleagues—she uses hand gestures to describe the current situation, placing herself about an inch and a half above current teachers, with staff almost 15 inches (ten times) further up, but talks about shifting more towards a staff position [Elizabeth, 287-289]. Stephanie uses a similar hand gesture both in our interview and in a meeting [11/17/95, p. 3] to describe her position in relation to other teachers and to staff. Doris says she feels "set apart" as a facilitator [Doris, 907]. Betty sees that "leadership...changes the dynamics [with colleagues]. It changes my ability to be part of a team of teachers" [Betty 639-40] whether that's in her role as a math specialist, or as a facilitator.

Stephanie sees her position as a facilitator as "unique"—because "we come from...and flow in with the ranks" and so can "hear some of their talking" [Stephanie I, 562-7]. Later she describes her role as a "bridge" between teachers and staff [Stephanie I, 599]. Ginny uses similar imagery as she talks about having 'one leg with you [staff] and one foot with them [teachers]' [11/17/95, p.4].

This image of changing position and increasing distance as one takes on the facilitator role is shared by several, but not all, facilitators. When asked whether there are issues in her relationships with colleagues as she takes on this leadership role, Sophie says, "No, that doesn't really bother me because I'm really comfortable in that particular kind of role. I just happen to know how to do this, but we've all got interesting stuff to share" [Sophie 404-6]. Phoebe, too, finds a leadership position congenial, though she also has more experience with such roles given her principal's certification and her less formal experience organizing and leading among her building colleagues. When asked how she feels taking on a leadership role, she says, "I like it. I think it's an interesting thing to try and be helpful to colleagues. Not that I have all the answers, I do not. But just to be a willing ear to a colleague is very helpful" [Phoebe, 300-2].

How are facilitators affected by their different ideas about how others will view them as leaders? Doris is worried about being the center of attention as a facilitator. "When I'm with a group, people sort of direct the conversation to me. And I certainly don't want that"

[Doris, 891-2]. Stephanie is finding colleagues don't quite believe her when she talks about the process of change:

> I may say to them, "Oh, I think you're gonna find a difference as time goes on." They kind of look at me like, "She's crazy." And I find that interesting...I really do feel that what I say is respected. But I'm getting the sense that there may be this feeling out there that, "Oh, yeah!"...And that, to me is a little different and a little surprising [Stephanie I, 1073-1083].

While Sophie feels comfortable taking on leadership roles, she is worried that people will dismiss her because she teaches Kindergarten. "It does concern me that people might not give me the kind of credibility because they see me as a pre-school teacher. But I don't think it will take them too long" [Sophie, 331-2]. Phoebe finds people's changing views of her surprising.

> People see me differently in the group. I've noticed it with math. They think I know the answer. Truly! ...And, oh, boy! If only they knew how few answers I know...I have to be very careful with how I say things because it can be taken as "Well that's the way it is, then." And that's NOT the way it is. That's simply another opinion [Phoebe, 804-15].

Elizabeth worries that as she shifts roles, she will become the object of people's frustration as she begins to "push" them.

> When I'm facilitating with colleagues, I think that it won't be quite as comfortable as it is now. Because I think some of the frustration of the hard work that's involved in change…is hard. And I think people feel frustration and often [it] is directed at the person making them do that. So whether it's warranted or not, I think I will be in a different position [Elizabeth, 273-279].

Shared Leadership

Whether it's because of the discomfort they feel with the distancing entailed by having expertise, or because of a commitment to building collaborative community as a vehicle for professional development, facilitators almost universally describe the importance of shared leadership of inquiry groups. Ginny invokes an image of reciprocity in her discussion of pushing and being pushed back, above. Elizabeth also assumes a norm of reciprocity in giving and receiving feedback about teaching—the "kinship of mucking about" she describes above—as she explains why developing skills as a facilitator is important to her.

> If I feel I can...go into someone's classroom and observe and give feedback then ...I feel like I can say to that person, "Can you come in and observe me?" And I'll always have that feedback that teachers so rarely get...Cause if I have those skills then...that will always be part of my teaching life. I see it as so important [Elizabeth, 430-441].

Doris describes an image of inquiry groups as running themselves. "When...there is really genuine dialogue between and among teachers, I think the group almost goes on its own and needs little facilitation from a designated facilitator" [Doris, 58-60].

For Phoebe, "An inquiry group is a more open forum. We're all colleagues as opposed to having somebody who's the leader. Everybody is contributing and getting things out of it and so a facilitator is less of a leader than say a principal is a leader. I don't think there's any telling people what to do here" [Phoebe, 409-13]. Stephanie describes how meeting her own goals depends on agreement and collaborative work with others.

> I know teaching is a collective profession. I guess I get that from being involved in a union. But I don't think that I can do a better job going against the tide. I need to have other people support my philosophy. Which means they need to be thinking maybe the way that I'm thinking. And if they are, then I'm also learning from them because they're going to bring something to the group that I don't have [Stephanie I, 1219-1224].

While facilitators all want a reciprocal structure for professional development, they also see the need for taking leadership. Stephanie says, "If I really want this to happen, I'm gonna have to do it. So, in that sense, I'm gonna have to be a leader" [Stephanie I, 1237-8]. Sophie has a view of shared leadership growing within an inquiry group. "I'm really convinced that the group ought to feel that they're all responsible for the leadership. They don't all have to be the leader, but they have to be responsible for developing the leadership style of the group" [Sophie, 259-62].

Discussion

How can these pulls, towards taking leadership while maintaining relationships be reconciled? Wasley claims that this tension arises because "the egalitarian ethos of teaching—the fact that all teachers hold equal position and rank, separated only by numbers of years of experience and college credits earned—makes it problematic for teachers to perceive their colleagues as experts" (Wasley, 1991, p.166). While her analysis is sociological, a view of women's typical development that highlights the value of care and relationship over power and control (Gilligan, 1982) gives additional insights. While teachers are used to an unequal role with their students, they seem wary to take on such a role with colleagues, especially when it seems to establish a "service relationship" in which the "central task [is] to foster the movement from unequal to equal"(Miller, 1976, p.5). If the point is to foster equality anyway, why give it up in the first place?

Tannen offers a glimpse of a way out of this dilemma but not through resolution in favor of one or the other. She reminds us that "power and solidarity," along with closeness and distance, "are in paradoxical relation to each other" (Tannen, 1994, p.22)

because (paraphrasing) 'solidarity, by entailing similarity necessarily limits freedom and independence, while power requires a relationship between participants.' Thus, we may not be able to choose one over the other, but rather, must look to construct a way to live comfortably (or not so comfortably) with both. Some of the facilitators seem intent on doing just that—i.e., finding a way to lead a group towards sharing power—but it is quite difficult to be intentionally acting paradoxically.

Given these difficulties, what makes it possible for some teachers to take on these roles. As noted above, some of the constraints are purely logistical—some teachers have the time to take on a sizable piece of new work with colleagues while others don't. Prior experience with leadership may also play a role, though this is complicated to evaluate. For example, it is interesting to note that the three facilitators who dropped out of the program after the first year were working on Masters degrees while all the rest have already completed Masters degrees. Do formal qualifications help facilitators feel more confident in ambiguous roles?

But leadership is, in fact, more subtle than formal roles and degrees. Ginny, Stephanie, and Phoebe gain "credibility" in their district in part because of their length of teaching experience, though they have different relationships with building colleagues. Stephanie and Phoebe are both active in the union and Stephanie was on the Superintendent's Advisory Board and is a grade level team leader for the new curriculum in the district. Phoebe also plays a "very back door" [Phoebe, 389] leadership role among grade 3-6 teachers at her school, often "kibbitzing" to gather information and design an agenda for "mini-faculty meetings" though that's not her formal role [Phoebe, 322-8].

Ginny's been doing math workshops in her district and is seen as a mathematics teaching resource in her building. Her move to teach a graduate class in math methods is in some ways a natural extension of this district-based work. She feels her leadership grows from a deeply felt responsibility to share her changes with colleagues.

> Well it's about time for me to do something...It's time to be doing something in a more leadership role. It is. It just is...I mean...you're learning all this good stuff, and it *is* enough to make that part of your rethinking who you are as a teacher. That truly would be enough. But...I'm a more public person than that. [Ginny, 1258-68]

Doris, Betty, Elizabeth, and Sophie are newer to teaching or to their districts. Therefore their leadership gets expressed in different ways than does that of Ginny, Stephanie and Phoebe. Betty 's job as math supervisor gives her a formal role as "expert" and she's been seeking out grant monies to fund other professional development work with district teachers.

Though Elizabeth 's only been teaching for seven years, up until this year (when she took a leave to teach abroad) they've all been at the same school, and she was the first teacher hired by a new principal who has hired one teacher each year since. In some ways, despite her relatively short tenure, Elizabeth has seniority among this strand of teachers. Elizabeth 's leadership is less formally structured but quite integrated into her everyday being and practice—she sees the experience in MFT and especially as a facilitator affecting her day-to-day interactions with colleagues.

> When I [used to be] in professional development events...my goal was to take what I needed and go. But now...my goal is still to take what I want or need and keep it, but it's also to share more with the group about my thinking or my experiences. I'm less likely to leave those very broad statements that people make about classrooms or curriculum or children out there. I really want to know what they mean when they say things, so I've done more questioning....I took lots of things that people said at face value and I'm less often willing to do that now [Elizabeth, 382-395].

Doris was delighted about her 'first professional consulting'—presenting about curriculum issues at a graduate class [11/17/95, p.3]—and her move to teach a math methods course with Ginny is also a natural extension of this work. But she feels frustrated and isolated in her building. "Typically my experience in the school is that everybody pretty much works in isolation and there's very little sharing" [Doris, 684-5]. She's been reaching out to several colleagues, but hasn't been very successful in her organizing. Doris feels that some of her difficulties may come from the culture of isolation and conflict avoidance she's felt every place she's taught including her current school. "People feel really uncomfortable with sharing something that might be considered controversial" [Doris, 754-5]. When she extends her vision to think about a group that includes people beyond her building to the district more broadly, she feels more comfortable [Doris, 928-932].

Sophie has some leadership roles within her school, for example as computer coordinator, but has also had several leadership roles outside of school, primarily "running things at church a lot" [Sophie, 410]. Just recently, she's also been helping to conduct a series of workshops for her building colleagues (coincidentally) along with another EDC staff member. But Sophie has a sense of calling to leadership, like Ginny.

> I really appreciate the opportunity to do the facilitation because it gives me a chance to show my stuff, for lack of a better word, for all of the skills I've developed over the years...skills in running groups, in helping adults and children learn, and facilitating conversations and negotiating with people [Sophie, 567-75].

Facilitators' formal education and prior experiences as leaders may give us some hints as to how they approach the paradox of leading towards shared power. But there are other

important issues to explore. In fact, the work of creating collaborative inquiry groups to develop constructivist math teaching may be paradoxical on several other levels as well. For example, shifting towards a constructivist view of learning also poses some seeming paradoxes—if you believe that people learn by being told things, then how can you *construct* a new epistemological understanding? Wouldn't you have to be *told* about this new view? But then you'd have no evidence for construction, but rather, just a confirmation of the transmission model. Yet this is only a paradox from within the transmission model. A constructivist view allows for learning by being told things—it posits a learner who actively makes sense of the things she is told. On the other hand, a transmission view cannot account for construction.

Perhaps the paradox of leading towards shared leadership can be solved similarly by defining leadership from *within* the shared leadership view. Leadership then is not "imposing something" on somebody else, as Phoebe describes above. Rather it is individual moves to "keep the community where it needs to be" [Phoebe, 220] in the context of "the group feel[ing] that they're *all* responsible for the leadership" [Sophie, 260].

But teachers don't all come to inquiry groups holding these views about learning or about leadership. That may be the source of some of the tensions facilitators feel as they imagine trying to create groups that in several ways don't fit teachers prior conceptions. Kegan alludes to similar sorts of conflicts in perspective in his discussion of people talking across constructive developmental levels (Kegan, 1994). These sorts of tensions are especially problematic because they derive from fundamentally different world-views.

For teachers who already hold a constructivist view, the activities of inquiry groups may feel reasonable, consistent, and supportive. But for those who don't, they may feel confusing or threatening. Betty speaks to this directly. "To feel comfortable in our inquiry group, you need to believe that children are constructors of knowledge rather than containers for knowledge you give them...There were people who didn't believe that, but they weren't comfortable [in the group]" [Betty, 67-72].

How do facilitators manage to speak at the several levels required to be both leading a group and helping it develop shared leadership? How do they create an environment where teachers feel like they have things to take home, even if these aren't the activity ideas of traditional professional development workshops? How do facilitators account for and support the different perspectives on learning and teaching that teachers in inquiry groups hold, while also providing opportunities to develop the constructivist views that characterize reformed teaching?

Conclusion

These are complex questions which will require substantial further investigation. Given the complexity and the newness of the task that MFT has set for facilitators, it's not surprising, in some ways that teachers have been wary to take it on. Yet this model for professional development can be powerful and deep. In fact, it is this very potential for depth that makes it possible and at the same time requires us to grapple with these sorts of difficult questions.

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